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Adaptation of the AAPOR Final Disposition Codes for the German Survey Context

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Abstract

Detailed and precise documentation is the key to scientific research and of particular importance for high-quality data collection. An important parameter for each survey is the response rate. It reflects how many persons initially invited to participate finally took part in a survey interview. In any case, every survey based on a probability sample should report its response rate, since it provides first and easily assessable information about the data collection process. The American Association for Public Opinion Research (AAPOR) has proposed Standard Definitions that include final disposition codes as guidelines for reporting of response rates. These definitions take various modes of data collection into account. However, the final disposition codes proposed by AAPOR are based on sampling and data collection practices in the context of the United States. To date, there is no clear guidance on how to adapt these definitions in a comparable manner for the German context. This survey guideline aims to close this information gap and offers operational definitions for the AAPOR final disposition codes that are applicable in the German context.

Citation

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1. Introduction

Detailed and precise documentation is the key to scientific research and of particular importance for high-quality data collection. An important parameter for each survey is the response rate. It reflects how many persons initially invited to participate finally took part in a survey interview.

Of course, a high response rate does not necessarily result in a survey with a low nonresponse bias, and, conversely, a low response rate does not necessarily indicate a high nonresponse bias (Groves & Peytcheva, 2008). Indeed, the crucial issue is whether nonresponse is systematic or unsystematic with regard to the characteristics the researcher is focusing on. If nonresponse is unsystematic, even a survey with a low response rate might not be biased, while if nonresponse is systematic, even a survey with a high response rate might be biased (Biemer & Lyberg, 2003; Sakshaug, Yan, & Tourangeau, 2010).

In any case, every survey should report its response rate, since it provides first and easily assessable information about the data collection process. The reported response rate and its calculation should be comprehensible and transparent. For instance, the documentation of the response rate should make clear which persons were excluded from its calculation and why. In practice, a large percentage of studies that report a response rate do not specify how it was calculated, thereby making it difficult or even impossible to compare response rates across different surveys. Let us imagine, for example, that we have two telephone surveys, with the first one treating all cases in which no one ever answered after a pre-specified number of calls as non-eligible cases, and the second one treating those cases as eligible non-contacts. If both surveys simply report a response rate of 20 per cent, it is (erroneously) suggested that the share of nonrespondents was the same in both surveys. However, since non-eligible cases are excluded from the calculation of response rates, this results in an overestimation of the response rate in the first survey. To sum up, the calculation of response rates should be standardized, well documented, and reproducible.

To solve this problem, the American Association for Public Opinion Research (AAPOR) has proposed Standard Definitions that include final disposition codes for various modes of data collection as guidelines for the reporting of response rates (AAPOR, 2016). These codes are grouped into four main categories, namely: (1) persons that were eligible and interviewed; (2) persons that were eligible but not interviewed; (3) persons of unknown eligibility that were not interviewed; and (4) persons that were not eligible and not interviewed. While these four categories work for all modes of data collection, the subcategories account for all kinds of responses that come along with the choice of a specific mode of data collection, resulting in coding schemes that are far from trivial. Moreover, AAPOR Standard Definitions also offer various alternative conventions (six different equations) for the calculation of response rates and indicate how these six response rates can be converted and directly compared with each other.

The comparability of the growing number of surveys, as well as the increasing importance of open science and open methodology with their focus on transparency in research, necessitates a standardization of response rates. Therefore, it is less surprising that the AAPOR Standard Definitions are becoming increasingly important and accepted in the field. In fact, scientific journals in the field of survey methodology and statistics have started to request data collection response rates in their methods section for new submissions (e.g., *Public Opinion Quarterly*, *Journal of Survey Statistics and Methodology*, and *Survey Practice*). Von Hermanni and Lemcke (2017) provide a good overview of practices in reporting response rates in different disciplines: they showed that the AAPOR Standard Definitions are used in 66.7 per cent of relevant articles in journals in the area of survey methodology but only 5.9 per cent in sociology, 19.5 per cent in political science, and 7.3 per cent in health and medicine.

For studies conducted in Germany, the percentages might be even lower because the AAPOR Standard Definitions, and specifically the final disposition codes, are based on sampling and data collection practices in the context of the United States. To date, there is no clear guidance on how to adapt these definitions in a comparable manner for the German context. Our survey guideline aims to close this information gap and offers operational definitions as well as examples of the AAPOR final disposition codes that are applicable in the German context.

Our guideline begins with a short introduction to the AAPOR Standard Definitions and briefly outlines mode-specific needs for adaptations for the German survey context. In the following sections, those adaptations are set out in greater detail for each mode of data collection. In addition, some sections also deal with specific features in the application of the Standard Definitions. For example, in the section focusing on mail surveys, we illustrate the calculation of the six response rates proposed by AAPOR. Moreover, in the section covering face-to-face surveys, new subcategories are integrated into the existing code scheme. Finally, the appendix contains tables for all data collection modes with our proposal of their final disposition codes for the German survey context.

2. The AAPOR Standard Definitions and their adaptation for Germany

The AAPOR Standard Definitions propose a system of disposition codes that is similar across different survey modes with respect to its underlying structure. In each survey mode, the AAPOR Standard Definitions distinguish between (1) persons that were eligible and interviewed, (2) persons that were eligible but not interviewed, (3) persons of unknown eligibility that were not interviewed, and (4) persons that were not eligible and not interviewed.

The generalizability of these four main categories to other national contexts is unproblematic because of their high degree of abstraction. Rather, problems of generalizability arise in the subcategories of these four main categories, and these problems vary between survey modes. For example, while for face-to-face surveys a large amount of adaptations to the German context is necessary, the adaptations for online and mail surveys are relatively straightforward. In the following, we will briefly discuss the specific challenges with respect to the German context. This is carried out for each survey mode, since all four modes still play an active role in the field of survey methodology in Germany (see Figure 1).

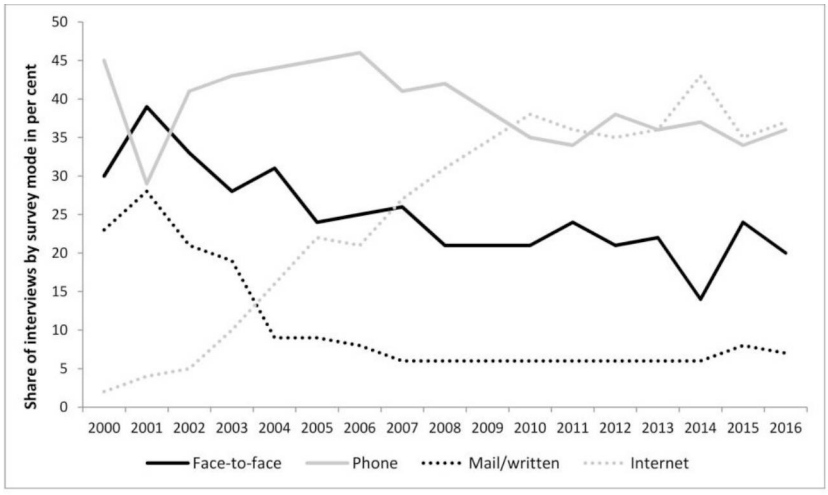

Figure 1: Share of interviews conducted by member institutes of the ADM (Arbeitsgemeinschaft Deutscher Markt- und Sozialforschungsinstitute e. V.) by survey mode 2000–2016 (data are missing for 2009 and were interpolated) (ADM, 2000–2016).

More detailed mode-specific advice, including concrete guidance for the adaptation of the AAPOR Standard Definitions for the German context, will be given in the next sections.

Telephone Surveys

Since the obligation to be listed in a telephone book was suspended for German telephone accesses in 1991, samples for telephone surveys (CATI) are typically generated by a method that was first introduced by Gabler and Häder (Häder, 2000). This particular approach creates samples that share some of the same problems with classic random-digit dialing (RDD) and random last digit (RLD) approaches. One, which is of particular interest, is that such samples also contain non-existent telephone numbers. Furthermore, although technical appliances such as predictive dialers are often used, the identification of such non-existent/non-eligible numbers can be quite cumbersome. Hence, particularly in CATI surveys, distinguishing non-eligible numbers from eligible numbers can be troublesome, which generally leads to a rather large proportion of numbers of unknown eligibility. The application of the AAPOR final disposition codes, in the case of CATI surveys, might be doubly impaired. The first reason is that the interpretation of different signals in the US might be different from that in Europe. The second one is more practically oriented. Since the proportion of category 3 (unknown eligibility) can impact on the magnitude of a response rate, and the report of a high response rate is generally desirable, a decision on subcategories that belong to category 4 (not eligible) might be favoured when a contact attempt is not made. However, such attempts to "raise" response rates can be misleading. Therefore, such problems as well as a more conservative application of the AAPOR final disposition codes are discussed in Section 3.

Face-to-Face Surveys

AAPOR final disposition codes for face-to-face interviews are specifically designed for sampling designs involving household sampling (AAPOR, 2016). According to AAPOR's definition, "an in-person household survey is assumed to be one in which housing units are sampled from an address-based sampling frame of some geopolitical area using one of several probability sampling techniques" (AAPOR, 2016, p. 23). Within a housing unit, one eligible person is selected for an interview via a systematic selection procedure, such as a birthday approach or a Kish grid. In the German context, the application of AAPOR final disposition codes to household sampling designs (e.g., a random-route approach in which a target person is selected within a sampled household) is quite straightforward. High-quality surveys in Germany, however, often choose a different sampling design: the registry-based selection approach. This two-stage stratified and clustered sampling design first selects municipalities (stage 1) and subsequently directly draws target persons from the population registries in these selected municipalities (stage 2). For surveys using registry-based samples of individuals, the AAPOR final disposition codes are not directly applicable but require various adaptations. Those adaptations are discussed in further detail in Section 4.

Internet Surveys

The adjustment of the AAPOR final disposition codes for Internet (CAWI) surveys for the German context is less problematic than for face-to-face surveys. There are several factors that are unique to Internet surveys, mostly having to do with the technical opportunities and challenges that are associated with such surveys. For example, since the invitation to participate in an Internet survey is sent electronically it can bounce back for various reasons. In this case, the decision needs to be made about the eligibility of Internet respondents to participate. The AAPOR Standard Definitions were updated recently

to include the calculation of response rates for probability-based online panels. Therefore, researchers in Germany can largely rely on the AAPOR final disposition codes to calculate response rates. In Section 5, we illustrate the application of the AAPOR disposition codes for Internet surveys using a practical example from the GESIS Panel, a mixed-mode panel of the general population in Germany, whose primary mode is CAWI. Several specific dispositions have been developed for the GESIS Panel, for example, detailed classification of bounced e-mails that can help researchers with detailed calculations. Also, we refer to software applications that have been developed to help researchers in practice.

Mail Surveys

Applying the AAPOR final disposition codes for mail surveys to the German context is quite straightforward. However, some minor adjustments are necessary since the AAPOR Standard Definitions were developed based on the information that the United States Postal Service (USPS) provides about reasons for undeliverable items. These reasons are more detailed than the ones provided by Deutsche Post, which decreases the number of possible final disposition codes in Germany. Moreover, Deutsche Post offers a variety of delivery types, each of them providing different information about reasons for nondeliverability. Therefore, the differences between the USPS and Deutsche Post, the various types of delivery options offered by Deutsche Post, and the final disposition codes for mail surveys in Germany are discussed in detail in Section 6.

In the following sections we describe the adaptation of the AAPOR disposition codes (AAPOR, 2016) for the German context for each survey mode separately.

3. Telephone Surveys

Computer-Assisted Telephone Interview (CATI) surveys are still one of the most frequently employed methods for conducting a survey in Germany (and worldwide). For instance, the German Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute (ADM e.V.) reported in 2016 that about a third of their surveys are still conducted in this mode (see Figure 1, p. 2). However, it often turns out (in Germany) that the reported response rates are lower than for most other modes. Besides the effects of respondents' behaviour on this rate, this problem might also be due to issues that arise from the sampling frame or from technical factors that are specific to that particular mode. While the sampling frame (and its construction in particular) may differ among countries, the technical procedures of a call (and the swapping of signals from "caller" to "recipient") are similar for the US and Germany. Hence, disposition codes and their interpretation do not differ largely in that respect between the US and Germany (see Table A1 in the appendix).

In order to outline particular problems in the application of the AAPOR Standard Definitions for telephone surveys (CATI), the commonly employed sampling frame of such surveys has to be taken into consideration. Due to various intricacies of the sampling approach that is typically applied for such surveys and to the technical appliances that are commonly used, various problems may emerge that are less frequent in other survey modes. Nevertheless, these problems may occur independently of the country a survey has been conducted in.

On the other hand, the proportion of contacts that might be interpreted as *unknown eligibility* is typically larger in CATI surveys and may also lead to erroneous assumptions and misreporting of a particular outcome rate. Therefore, this section aims to aid in the correct application of the AAPOR Standard Definitions in Germany rather than to adjust these standards for a German survey setting. This is because the disposition codes should generally be considered to be also applicable in the German context. Hence, there is no actual need to change the disposition codes, but rather a need to clarify how certain signals are to be interpreted and into which category a signal actually falls.

Another problem may also be the correct application of the final call/contact outcome. The variety of final vs last contact outcomes may be larger in the case of CATI surveys than for other survey modes, which is the reason that this section also aims to help in deciding on a final contact outcome.

In order to do so, the following subsection will explore problems that might occur when determining outcome rates that are particularly linked to the sampling procedure, the sampling frame, and the set-up when contacting the German population via telephone. The subsequent subsection will then provide advice on measures to ensure a more correct reporting of response rates in CATI surveys.

3.1 Set-up of CATI Surveys and Problems in Measurement of Response Rates

Since telephone registers in Germany stopped providing a (nearly) complete list of all telephone accesses in the early 1990s,[1] Gabler and Häder (Häder, 2000) established a method in the mid-nineties, which allows a sample frame to be generated that takes listed as well as non-listed telephone numbers into account and permits sampling with equal probabilities. Due to various intricacies of the German numbering system, such as varying lengths of prefixes and telephone numbers, a typical random-digit dialing (RDD) approach is not advisable when sampling German landline numbers, since it would have a low hit rate (Häder, 2000; Sand, 2015a).

A further concern is the coverage of the German frame for landline samples. Due to the increasing prevalence of the dependence on mobile devices and the occurrence of households that solely rely on

[1] In 1991, the obligation to list an access in a telephone register was abolished.

their mobile phone (mobile-only), landline samples alone often do not suffice to survey the general German population. Hence, for surveys with such target populations, so-called dual-frame surveys, which consist of independent samples of landline and mobile phone numbers, are generally advisable. Since German mobile phone numbers differ from landline numbers in their length and prefixes,[2] they are typically sampled via an RDD frame for the relevant prefixes.

In contrast to other survey modes, such as face-to-face and mail surveys, where registers can at least theoretically be employed to directly sample a particular person, telephone surveys generally start with a list of telephone numbers. These telephone numbers usually do not contain any personal information. By dialling such a number, one generally contacts a household (landline), a person (mobile), or neither of these. Due to how the sampling frames are constructed, both contain a relatively large proportion of numbers that do not lead to an existing access and/or are of unknown eligibility. It can be assumed that about 50 per cent of all generated numbers do not contact actual telephone accesses (Häder & Sand, 2018).

To automatize contact attempts and the management of telephone numbers within a sample, telephone labs often employ technical devices such as predictive dialers that (are supposed to) check whether a number is not connected, organize numbers for further call attempts, and distribute positive contacts to available interviewers. However, even if these devices may improve the efficiency of telephone surveys, they will not detect all numbers that are not connected and might be prone to error. Gramlich, Liebau, and Schunter (2018) and Sand (2016) both show that technical implementations to detect unconnected numbers may create both false positive and negative outcomes. However, most of the numbers that are screened out by such implementations are true positives and differing results with later contact attempts may also be due to changes in status of a number during the period of fieldwork.

When contacting a particular number, two more outcomes may occur more frequently than in other register-based sample surveys. Firstly, if a contacted number leads to an existing access, it cannot be guaranteed that the contacted household or the person belongs to the target population. In contrast to samples based on population registers, where the persons/households that are part of the sample can often be selected based on their belonging to the target population prior to the actual selection process, a screening process has to be in place to determine whether a contact via telephone number leads to a desired interviewee. Hence, the proportion of category 3 and 4 (unknown eligibility and not eligible) of the disposition codes tends to be larger in the case of telephone surveys than for other survey modes. To further complicate the matter, in the case of landline samples, a two-step approach is generally applied, since it is normally assumed that a landline number leads to a household rather than to a person.[3] Since nonresponse might occur either for the person contacted or the selected person of the target population within the household, determining whether such instances belong to category 2 (eligible, but not interviewed) or 4 (not eligible, not interviewed) may be cumbersome.[4] Therefore, if the contacted person refuses to participate, the disposition code may be regarded as category 3 (unknown eligibility). Depending on the reported response rate, this impacts on its value in a negative way.

Secondly, the signals that are exchanged between the dialling and receiving end of a number can sometimes be hard to interpret. Gramlich et al. (2018) argue that even if the status of a particular number has been established correctly, the disposition of contact attempts may still be unclear when no one answers the telephone and it cannot be determined whether or not the number leads to a member of the target population. Moreover, some signals and recorded messages that are typically

[2] For more information see, for example, Sand (2015b) and Heckel and Wiese (2011).

[3] That is often not the case in mobile surveys, since a mobile phone can be regarded as a personalized item.

[4] For instance, when the person contacted refuses to answer the screening questions, it is hard to determine whether this refusal belongs to category 2 or 4 since it is unknown whether a person that is a member of the target population exists within the contacted household.

encountered when conducting a telephone survey are ambiguous. For instance, a dialling tone may not necessarily mean that a dialled number leads to an existing access. However, it is often assumed that a number that has been contacted for numerous attempts, which all resulted in dialling tones, does not lead to an existing access. We argue that this assumption may neglect the fact that some of those call outcomes simply lead to persons that are generally hard to reach. Therefore, even if such results are labelled as ineligibles, and thus the value of some response rates is boosted, the reported value is based on faulty assumptions and may then overreport the actual, achieved response rate. Hence, such labelling implicitly redefines the target population and excludes hard-to-reach households.

On the other hand, signals that lead to false positive labelling may also appear frequently. Recorded messages such as *"Der Teilnehmer ist vorübergehend nicht erreichbar"* (*the number you have called is temporarily unavailable*) may suggest that during that particular time of calling, a specific and existing access cannot (for various reasons) be contacted. However, the message actually indicates that a contact could not be established. This can either happen when no physical device is connected to an actual access or when it has not been possible to contact a part of a particular network. The latter then may or may not contain an access under the given number. If not, the number would fall into category 4 (not eligible). But due to the ambiguous message, it can only be labelled as unknown eligibility.

The examples above reflect cases that are typically encountered when conducting a telephone survey that may all lead to a comparatively large proportion of call outcomes that fall into category 3 (unknown eligibility) of the AAPOR final disposition codes. When reporting the response rates 1 to 4 proposed by AAPOR (2016, pp. 61–62), this may generally lower their value. Since such lower values are generally not appreciated and the subcategories of disposition codes also provide a certain degree of leeway in (intuitively/creatively) labelling call outcomes, the following section will describe measures to safeguard the (more) correct reporting of response rates and some that even may improve the reported values.

3.2 Measures to Ensure the Correct Reporting of Response Rates in CATI Surveys

To mitigate the previously mentioned uncertainties (at least to some extent), the employment of particular technical appliances might be advisable. In the case of larger telephone labs, predictive dialers are often used. Such hardware components are often interjacently connected with the lab's telephone line and a central computer. These appliances then firstly allow the adequate management of telephone numbers within a sample and the respective coding of particular call outcomes. More importantly, the hardware dials a particular number prior to the interview and may eliminate numbers that do not lead to an existing telephone access. Such devices usually reference the signal obtained when dialling a number and allocate contacts to existing accesses to non-busy interviewers. However, since, for example, Gramlich et al. (2018) show that such devices may produce false positives as well as false negatives, it may be advisable during the field period to also re-evaluate those numbers that have already been sorted out due to the dialler's assumption that the numbers do not lead to an access. Furthermore, the use of such devices does not guarantee the elimination of all ineligible numbers, although it will clarify the status of a large proportion of numbers and therefore "improve" the reported response rate by lowering the proportion of numbers of unknown eligibility.

Due to the costs of acquiring such devices and their maintenance, smaller survey institutions often do not have access to such benefits. In such cases, viable options usually include a software-based predictive dialer. These programs, which are in some cases even freeware, allow at least a more coordinated processing of the sampled numbers during the fieldwork period. Additionally, the status of each call outcome can be captured.

In the case of mobile surveys, similar applications are available. Due to the construction of mobile networks, so-called *Home Location Register (HLR) Lookups* are a viable option to determine the status of

mobile numbers prior to fieldwork.[5] With such Lookups, one can evaluate a given sample of mobile numbers and obtain information on whether or not numbers lead to an existing access (and if the particular device is switched on). Both Struminskaya et al. (2011) and Kunz and Fuchs (2011) have already shown that such Lookups are an inexpensive option for reducing the proportion of numbers of unknown eligibility, while also lowering the costs of conducting a mobile survey. Since HLR Lookups are an integral part of every mobile network infrastructure and happen numerous times without exogenous queries (from fieldwork agencies, etc.), their reported results can generally be assumed to be reliable. However, Sand (2016) shows that the reported results may differ according to the company that offers such queries. Hence, a cautious approach that compares the results of a smaller batch of numbers from different companies (and sometimes with actual call outcomes) might be advisable. Furthermore, we suggest re-evaluating all numbers of a particular sample when the fieldwork exceeds three to four months because of changes in the status of these numbers.[6]

Fieldwork agencies usually have a standardized coding and interpretation procedure for different call outcomes and dialler results that can be transferred to the AAPOR final disposition codes, which is also often practised. However, in order to determine a particular response rate in the most appropriate manner, the researcher themself has to distinctively articulate the composition of the target population. Due to particular characteristics of the target population, various call outcomes may fall into different disposition codes. If, for instance, the target population contains German households instead of reflecting the German population, a refusal to participate by the contacted person may fall into category 2 (refusal), whereas if the latter is the target population, such a call outcome will fall into category 3 (unknown eligibility). For the latter case, this may be due to the lack of opportunity to determine whether the household contains at least one person that is a member of the target population. However, when the target population consists of households, a successful contact attempt may already be sufficient to determine the belonging to the target population (in that case, the household), e.g., by the way someone answers a phone.

Hence, a clear definition of the target population must be available before the actual allocation of call outcomes and dialler results takes place. Gramlich et al. (2018), for instance, define particular obstacles that may be encountered when coding call outcomes into the AAPOR final disposition codes that will affect the reported value of at least some rates and hence misguide the evaluation of surveys. Since such transcoding errors may arise from a lack of understanding of how the survey has been conducted, the knowledge of how the sampling frame has been created, the definition of the target population, the sampling procedure and the management of the fieldwork are imperative for translating one coding scheme into another and thus for reporting correct response rates. Therefore, the authors argue that the aim of reporting AAPOR response rates in an appropriate manner should already be taken into consideration when planning a survey and programming the instrument(s).

In addition, it can be argued that, for the correct reporting of response rates, the appropriate transformation of call outcomes into one of AAPOR's four main categories is of utmost importance, since misspecifications may directly bias the reported response rates. In the case of CATI surveys, such misspecifications are likely when it is unclear whether a particular call outcome is directly related to a member of the target population or if a contacted number actually leads to a household that contains members of the target population. Hence, failures may arise when particular codes that may belong to various categories depending on whether the result manifested is for the contacted person or the target person are used naively. The previously mentioned example of refusal by the contacted person may be used as an example of such problems. When something like that occurs during the initial contact, it might be

[5] For more information on HLR Lookups and their technicalities see Sand (2016).

[6] In cases of status change, a more prudent approach would be to give more weight to results that report a number to exist within all Lookups. This would arguably lead to a lower reported value of some response rates due to accounting for (potential) numbers of unknown eligibility or ineligible numbers as eligible ones.

regarded as part of category 3 (unknown eligibility). On the other hand, if it has already been established that the household contains at least one member that belongs to the target population, the outcome that superficially looks the same to the previous one would lead to the attempt being added to category 2 (eligible, non-interview) since an actual member of the target population refused to participate. Such a refusal may either occur directly, when the person that has been contacted is a member of the target population, or indirectly, when the contacted person does not belong to the target population but all call attempts fail to interview the person of the household that is a member of the target population.[7] Thus, a clear definition of the target population paired with an understanding of its implications is as much of importance as an understanding of the sampling procedure that takes place, in order to report response rates correctly.

Gramlich et al. (2018) also point out that the call outcome that has been employed to calculate the response rate is of great importance when numbers are called for numerous attempts with varying results per attempt. The authors argue that, since some numbers within a CATI survey are (often) called several times, the importance lies in the distinction between the final and the last call outcome. The authors notice that a common mistake in the calculation of response rates is the usage of the last call outcome to determine the final disposition code. Since call histories of a particular number may vary in their call outcome and also in their quality of information for each call outcome, this naive approach may lead to erroneous assumptions.[8]

The last call outcome in this scenario is simply the call outcome that has the numerically highest value in a sequence of call attempts. The final call outcome, on the other hand, is that particular outcome in a sequence of call attempts that provides the most reliable information for a particular number. Due to this distinction, the last and the final call outcome may be the same for some sequences of call attempts, e.g., sequences that end with an interview, a refusal (by the target person), or a sequence that shows that the number does not exist (for several call attempts). However, it is important to follow the entire sequence and determine which of the subsequent attempts provides the most important information about a particular number, because in some instances, such as those that are shown in Table 1, the last and the final call outcome may differ. Hence, a hierarchy of call outcomes is of utmost importance. Generally, call outcomes that contain more information about the corresponding access and whether or not it belongs to a unit of the target population should be treated as more relevant.

Table 1: Last vs final call outcomes in two sequences of call attempts

Example	Call Attempt	Result	AAPOR Category
1	1	dial tone	3
	2	telephone answering device confirming HH	2/ 3
	3–10	dial tone	3
2	1	telephone answering device confirming HH	2/3
	2–5	dial tone	3
	6	target person not available	2
	7–10	always busy	3

[7] For such a scenario, the target population should contain persons, not households.

[8] Of course, those aspects also hold true for all other survey modes in which several contact attempts are realized.

In example one, the naive application of "last call outcome equals disposition code" may lead to a misclassification since it has already been established by the time the second call attempt is conducted that the particular number leads to an existing household. However, whether the call sequence and the appropriate final call outcome (attempt no. 2) are assigned to category 2 (eligible, non-interview) or 3 (unknown eligibility) is dependent on the definition of the target population. Nevertheless, call attempt 2 provides more information on that number than any other call attempt.

In the case of example 2, assigning the last call outcome to the AAPOR classification would most certainly lead to an overestimation of some response rates. In this particular example there are two call outcomes within the sequence that provide more information than the last one. Call attempt 1 alone would result in the same outcome that has previously been described. However, attempt 6 provides us with the information that the household has already been contacted and a member of that household that belongs to the target population has already been determined and selected. Since the interview has nevertheless not been completed, the sequence for that number would most certainly be assigned to category 2.

It should be noted that using the final instead of the last call outcome to determine disposition codes may often lower response rates 3 to 6 (AAPOR, 2016, pp. 61–62). This is due to the fact that more call sequences would be counted as eligible, non-interviews than as unknown eligibility. Therefore, simply assigning the last call outcome may be tempting when response rates are regarded as the key indicator of the quality of a survey. However, in doing so, the risk of biasing the perceived quality of results will equally increase.

In order to calculate and report response rates for CATI surveys more correctly, the following recommendations should be considered:

- The definition of the target population is crucial for the sampling process. Hence, distinct adaptations to the disposition codes that are necessitated by the target population should be outlined before the fieldwork period starts.
- Predictive Dialer and similar software solutions may help to clarify cases of unknown eligibility and the general fieldwork management. However, even hardware devices might produce erroneous results, and numbers that are flagged as non-existent or ineligible may actually exist. Therefore, it may be preferable to test such numbers a second time. In the case of mobile samples, HLR Lookups have been shown to reduce the proportion of numbers in category 3 (unknown eligibility) and to improve the hit rate of mobile surveys. Nevertheless, Sand (2016) has shown that the results of such Lookups may differ between particular providers of such services. Hence, testing the provider and its reported outcomes with a subset of the actual sample may help to avoid problems, particularly those of false negatives.
- The disposition code for a number should always be based on the final instead of the last call outcome. Therefore, it is important to consider the entire sequence of call attempts when deciding on a disposition code and the outcome that provides the most information about the corresponding access and whether or not it belongs to a unit of the target population.
- Transferring call outcomes naively may lead to misclassifications. When transferring such outcomes, the sampling process should also be taken into consideration to avoid such failures.
- Reporting the response rate specifically is important for an understanding of such metrics. Therefore, it is imperative to report the distinct response rate (e.g., RR1, RR3, etc.) that has been calculated, including information on how key parameters such as the eligibility rate have been established.

4. Face-to-Face Surveys

For face-to-face surveys, AAPOR focuses on in-person household surveys realized as interviewer-administered face-to-face interviews, with an underlying design that assumes a probability-based sampling approach in which first housing units are sampled and then, per housing unit, an eligible person is selected at random for the subsequent interview (AAPOR, 2016).

Two random sampling designs are widely used in high-quality interviewer-administered face-to-face social surveys in Germany: the ADM sampling system and the registry-based selection approach. The ADM sampling system consists of a three-stage stratified design that includes the selection of areas at stage 1, the selection of households by a random-route approach at stage 2, and the selection of an eligible person at stage 3 (Häder, 2016). This sampling approach is in line with the assumptions and conditions underlying the AAPOR Standard Definitions for an in-person household survey, and the application of AAPOR final disposition codes is quite straightforward. This sampling approach may, however, be subject to certain restrictions, especially if stage 2 does not include a separate processing step between listing the household addresses and contacting households to carry out the survey interview (Häder, 2016; von der Heyde & Löffler, 1993). For instance, survey organizations can monitor interviewers and their accuracy in selecting households and persons only to a limited extent. The approach gives interviewers more discretion in the selection of target persons and can, in extreme cases, result in higher but biased response rates because of an over-representation of more cooperative persons (Koch, 1997, 1998; Schnell, 1997). Given the straightforward application of the original AAPOR scheme for this sampling approach, no further elaborations are required here.

The best practice design currently followed in the majority of large-scale population surveys in Germany (e.g., ALLBUS, ESS, pairfam, and PIAAC)[9] is the registry-based selection approach. This is a two-stage stratified and clustered sampling design, in which first, municipalities are selected at stage 1, and subsequently, at stage 2, eligible persons are randomly drawn from the population registries of these selected municipalities. This approach yields a sample of individuals (with names and residential addresses). Consequently, it is not a household survey as defined in the AAPOR Standard Definitions but rather a survey of individuals. This differentiation is important for the following attempt to transfer AAPOR final disposition codes for face-to-face surveys into the German context, as it entails certain assumptions and adaptations. Please note that the assumptions made in this section reflect only one possible course of action. If other assumptions are made, the adapted disposition codes presented here will need to be reconsidered. In particular, the allocation of a case to one of the main outcome categories, i.e., (2) eligible, non-interview, (3) unknown eligibility, or (4) not eligible, might change, which may affect the calculated response rate. The aim of this contribution is to present one possible approach that illustrates the application of the AAPOR final disposition codes to face-to-face surveys in Germany, given a set of proposed assumptions.

4.1 Assumptions for Applying AAPOR Final Disposition Codes to the German Context

Registry-based sampling in Germany assumes that the names and addresses of the selected individuals supplied by the local registries in the selected municipalities are valid. Accordingly, all selected individuals are considered to be eligible as long as there is no contradictory information from the field. The AAPOR Standard Definitions indicate that each survey "should define a date on which eligibility status is determined" (AAPOR, 2016, p. 24). Choosing an appropriate status day is important and requires

[9] German General Social Survey (ALLBUS, Allgemeine Bevölkerungsumfrage der Sozialwissenschaften): Wasmer, Blohm, Walter, Jutz, and Scholz (2017); European Social Survey (ESS): European Social Survey (2016); German Family Panel (pairfam, Beziehungs- und Familienpanel): Huinink et al. (2011); Programme for the International Assessment of Adult Competencies in Germany (PIAAC): Zabal et al. (2014).

careful consideration. Key factors include, for example, the period between sample selection and the start of fieldwork, the duration of fieldwork, and the point in time at which cases are released into the field. We propose defining the status date as the first personal contact of an interviewer with the household of the selected target person. Ideally, the target person is met personally at the first contact, but since they may also be absent for several reasons (e.g., at work, away for a certain period, moved) it is important to emphasize that for such cases the first contact is made with the target person's household to obtain information about the target person's whereabouts. In any case, the eligibility status should be verified at this time (status date).

4.2 Applying AAPOR Codes to the German Context: A Proposal

Table 2 shows an overview of the final disposition codes for in-person household surveys as indicated in the AAPOR Standard Definitions (AAPOR, 2016, p. 76) with our proposed extensions and adaptations to the German context, i.e., with respect to a registry-based sampling design and the assumptions introduced in the previous paragraph (the final adapted list is given in Table A2 in the appendix). A number of dispositions require no adaptation whatsoever – e.g., interviews, refusals – and the AAPOR code can be applied as is. Please note that "target persons" are referred to as "respondents" in the AAPOR labels and we have maintained this terminology there for the sake of consistency. Some codes are not meaningful in the context of a registry-based sample – e.g., no screener completed, group quarters, quota filled – and thus these codes are omitted. The note added for code 2.111 specifies the scope of the code. In one case (code 2.23), an additional interpretation is included that reflects a particular situation that can occur in the field.

The status date determines which disposition code is applicable for the following incidents: deaths, institutionalizations, and moves abroad. If one of these events occurred prior to the status date, a category 4 code (not eligible) should be chosen (codes 4.16 to 4.18). If the incident occurred after the status date, a category 2 code (eligible, non-interview) is appropriate. Our proposal has adapted existing codes (e.g., code 2.31) and defined new subcodes for this purpose (code 2.40 with the subcodes 2.42 and 2.43). New dispositions were inserted in the logically correct placement in the table, but the numerical codes are not necessarily sequential because appropriate codes were often already assigned to other dispositions in other modes, so the first available code had to be chosen.

Table 2: AAPOR disposition codes for in-person household surveys and their adaptation to the German context for registry-based face-to-face surveys

# Code	Final Dispositions (AAPOR)	Final Dispositions for Registry-Based Sampling in Germany	Annotations
1.0	**Interview**	=	
1.1	Complete	=	
1.2	Partial	=	
2.0	**Eligible, non-interview**	=	
2.10	Refusal and break-offs	=	
2.11	Refusals	=	
2.111	Household-level refusal	=	**Note:** Refers to refusals by contact person in household; may include respondents not yet identified as such
2.112	Known-respondent refusal	=	
2.12	Break-off	=	
2.20	Non-contact	=	
2.23	Unable to enter building/reach housing unit	=	**Extended scope:** Also applies to apartment buildings in which names are missing on doorbells or mailboxes and interviewers cannot determine in which apartment the respondent lives
2.24	No one at residence	=	
2.25	Respondent away/unavailable	=	
2.40		Respondent moved	**Extension**
2.41		Respondent moved within country but cannot be followed up	**Extension**
2.42		Respondent moved abroad **after** status date	**Extension**
2.43		Respondent moved to institution **after** status date	**Extension**
2.50		Not attempted or worked	**Extension**
2.30	Other	=	
2.31	Dead	Respondent died **after** status date	**Different label**
2.32	Physically or mentally unable/ incompetent	=	
2.33	Language problem	=	
2.331	Household-level language problem	=	
2.332	Respondent language problem	=	
2.333	No interviewer available for needed language	=	
2.36	Miscellaneous	=	

(*Table 2:* continued)

# Code	Final Dispositions (AAPOR)	Final Dispositions for Registry-Based Sampling in Germany	Annotations
3.0	**Unknown eligibility, non-interview**	=	
3.10	Unknown if housing unit		**Omission**
3.11	Not attempted or worked		**Omission.** Analogous code added under 2.50
3.17	Unable to reach/unsafe area		**Omission**
3.18	Unable to locate address		**Omission**
3.20	Housing unit/unknown if eligible respondent		**Omission**
3.21	No screener completed		**Omission**
3.80		Unknown whereabouts	**Extension**
3.81		Respondent moved, unknown whereabouts	**Extension**
3.82		Respondent not known at address	**Extension**
3.90	Other	=	
4.0	**Not eligible**	=	
4.10	Out of sample	=	
4.16		Respondent moved to institution **prior** to status date	**Extension**
4.17		Respondent moved abroad **prior** to status date	**Extension**
4.18		Respondent died **prior** to status date	**Extension**
4.19		Address does not exist or not residential address	**Extension**
4.50	Not a housing unit		**Omission**
4.51	Business, government office, other organization		**Omission**
4.52	Institution		**Omission**
4.53	Group quarters		**Omission**
4.60	Vacant housing unit		**Omission**
4.61	Regular, vacant residences		**Omission**
4.62	Seasonal/vacation/temporary residence		**Omission**
4.63	Other		**Omission**
4.70	No eligible respondent		**Omission**
4.80	Quota filled		**Omission**
4.90	Other	=	

Notes:
Equal sign (=) indicates no change made to AAPOR label.
Omission = AAPOR final disposition code deleted.
Extension = New final disposition code added.
The terminology "respondent" corresponds to "target person."
The codes for the new dispositions introduced for registry-based sampling in Germany were chosen so as to avoid overlap with already existing AAPOR codes (across all modes). In certain cases, new dispositions were inserted in the logically best place in the table, although the code numbering does not fit because no appropriate free codes were available.

If a target person moves from the drawn residential address to a new place of residence within Germany before a final disposition code can be assigned, an attempt should be made to obtain the new address (irrespective of whether the move takes place before or after the status date). Sometimes interviewers can obtain this information (e.g., from neighbours); if not, best practice is to initiate a request for an address search at the local registries. If the target person has moved within Germany, the survey

organization should try to send an interviewer to this new address in order to contact the target person (if this is feasible within the specific survey constraints). In some cases, however, a follow-up is not possible, e.g., when the target person has moved to a remote area where no interviewer is available. For this case, a new category 2 code was created (code 2.41: respondent moved within country but cannot be followed up). If a target person is not known at the residential address or their whereabouts cannot be determined, this case can be coded under category 3 (unknown eligibility, non-interview). The new code 3.80 and two corresponding subcodes (codes 3.81 and 3.82) were introduced to account for these dispositions. Sometimes, the local registries deliver sample persons' addresses that do not exist or are not residential addresses. A separate code (4.19) under category 4 (not eligible) was introduced to cover such situations. In addition, the original AAPOR code 3.11 (not attempted or worked) was moved to code 2.50, because in the case of a registry-based sample these cases are by default regarded as eligible, non-interviews.

5. Internet Surveys

Internet surveys are a relatively new method of data collection compared to face-to-face and telephone surveys. Since the Internet works, broadly speaking, the same all over the world, applying the AAPOR Standard Definitions (AAPOR, 2016) for Internet surveys is straightforward (see Table A3 in the appendix).

In Internet surveys, invitations to participate are often sent electronically with a possibility that the invitation could be intercepted by the spam filter or bounced back due to a non-existent e-mail address, technical difficulty, or the e-mail postbox having reached storage limits. In this case, a decision needs to be made about the eligibility of such Internet respondents to participate: cases with bounced e-mails can be counted as eligible non-contact or cases of unknown eligibility.

The AAPOR Standard Definitions (2016) provide an overview of the final disposition codes that is applicable to Internet surveys for specifically named persons as well as probability-based Internet surveys, that is, surveys based on the lists of populations with high Internet coverage or mixed-mode designs in which the respondents were initially recruited in an offline mode such as face-to-face, by telephone, or by mail and invited to participate in an Internet survey (Couper, 2000). For non-probability Internet surveys, response rate calculations cannot be made, but the calculations of completion rates (see Callegaro & DiSogra, 2008).

Probability-based online panels

The AAPOR Standard Definitions (AAPOR, 2016) were updated recently to include the calculation of response rates for probability-based online panels, and researchers in Germany can largely rely on the AAPOR Standard Definitions to calculate response rates.

In the case of panel surveys, an AAPOR response rate should take into account all sources of nonresponse at each stage of the panel recruitment and survey administration process. It is insufficient to present a completion rate to a specific Internet survey or wave, although it is often presented as a response rate. The response rate for a particular wave is usually obtained by multiplication of the recruitment survey response rate, if applicable, the profile (initial) survey response rate, and the completion rate of a specific wave. This combination should be clearly distinguished from a simple wave completion rate.

A practical example

In the following, we illustrate the application of the AAPOR final disposition codes for Internet surveys using a practical example from the GESIS Panel.

The GESIS Panel is a probability-based mixed-mode panel carried out by GESIS – Leibniz Institute for the Social Sciences in Mannheim, Germany. Its sample encompasses the German-speaking population aged 18 and above permanently residing in Germany. The survey waves of the GESIS Panel take place every two months and the sample is split up into two survey modes (offline and online). About a third of the panel members participate online in an Internet survey, and a third participate in the survey by mail (Bosnjak et al., 2018).

The AAPOR Standard Definitions-based outcome codes are presented in Table 3. Several specific dispositions have been developed for the GESIS Panel, for example, detailed classification of bounced e-mails that can help researchers with more detailed calculations and/or operation of the panel.

Table 3: Scheme of final disposition codes used by the GESIS Panel

# Code	Final Disposition Codes (GESIS Panel, CAWI-participants)
1.0	**Returned questionnaire**
1.1	Complete
1.2	Partial or break-off with sufficient information
2.0	**Eligible, non-interview**
2.10	Refusal and Break-off
2.11	Refusal
2.111	Explicit refusal
2.112	Implicit refusal
2.1121	Logged on to survey, did not complete any items
2.1122	Read receipt confirmation, refusal
2.12	Break-off: questionnaire too incomplete to process/break-off or partial with insufficient information
2.20	Non-contact
2.26	(Notification that) respondent was unavailable during field period
2.27	Completed questionnaire, but not returned during field period
2.30	Other
2.31	Death
2.32	Physically or mentally unable/incompetent
2.33	Language barrier
3.0	**Unknown eligibility, non-interview**
3.10	Nothing known about respondent or address
3.11	Not mailed/No invitation sent
3.19	Nothing ever returned
3.30	Invitation returned undelivered (e-mail bounced)
3.3113	E-mail bounced: delivery problem
3.3114	E-mail bounced: mailbox unknown
3.3115	E-mail bounced: postbox full
3.3116	E-mail bounced: spam filter
3.40	Invitation returned with forwarding information
3.90	Other
4.0	**Not eligible, returned**
4.10	Selected respondent screened out of sample
4.90	Other

AAPOR Standard Definitions allow some degrees of freedom in establishing what proportion of questions answered can count as a complete interview, partial interview, or break-off. For the GESIS Panel, complete responses are defined as 80% and more of answered substantial questions. Partial response is defined as 50–80 % of answered substantial questions (i.e., all questions with the exception of the survey evaluation questions). Break-off is defined as providing an answer to at least one substantial question and to less than 50% of substantial questions. Refusal includes active (explicit) and implicit (leaving the questionnaire unanswered) refusal (AAPOR, 2016, p. 29).

In addition to calculating the response rates "by hand", it is possible to use the Excel-based response rates calculator provided by AAPOR[10] or specifically designed software applications such as the "RRCALC" Stata module developed by Weyandt and Kaczmirek (2015) to help researchers in practice.

[10] Version of May 2016: https://www.aapor.org/Education-Resources/For-Researchers/Poll-Survey-FAQ/Response-Rates-An-Overview.aspx

6. Mail Surveys

Mail surveys are a classic data collection mode and are still regularly used for high-quality surveys in Germany and around the world. Although their importance decreased in Germany in the first decade of the 21st century, the overall share of mail surveys seems to have been quite stable in recent years at about 7%, suggesting that mail surveys will continue playing an active role in the field of survey methodology in the future (see Figure 1, p. 2).

The final disposition codes for mail surveys proposed by AAPOR were developed based on the United States Postal System (USPS) and therefore need specific adaptations in order to be applicable in other contexts. Hence, this contribution aims to propose such adjustments for Germany. Previous versions of the AAPOR Standard Definitions only covered codes for mail surveys of specifically named persons. However, in the recent version of their Standard Definitions, AAPOR took into account the variation of sample designs for mail surveys by including final disposition codes for mail surveys of unnamed persons additionally (AAPOR, 2016). While in mail surveys of specifically named persons the named person is the appropriate respondent, the sampling units in mail surveys of unnamed persons are addresses or companies. Within these addresses or companies, a screener is often used to identify the appropriate respondent (e.g., the person with the most recent birthday, or the head of human resources).

In the following, we focus on codes that have to be adjusted by discussing first mail surveys of specifically named persons and second mail surveys of unnamed persons. In addition, the contribution provides a case study of the GESIS Panel to illustrate how the codes can be applied in the German context. This example also suggests that the adaptation of the AAPOR codes should always be carried out against the background of the specific sampling frame and study design.

6.1 Disposition Codes for Mail Surveys of Specifically Named Persons

Overall, applying the AAPOR codes for mail surveys of specifically named persons to the German context is straightforward. However, some adaptations are necessary due to differences between the USPS and Deutsche Post with respect to the reasons communicated to the sender as to why the delivery of a letter failed.[11] Moreover, the choice of a certain option of delivery is also important because the sender will receive more or less information about reasons for non-deliverability depending on the type of delivery.

When conducting a mail survey of specifically named persons, a researcher or survey organization can choose between three types of delivery, namely standard delivery, Einschreiben (registered post), and Dialogpost (customer post). Standard delivery is probably the preferred choice of researchers or survey organizations carrying out a mail survey. The costs vary between 0.70 and 2.60 euros (as of May 2019), depending on the size and weight of the letters. When a letter sent with standard delivery is not deliverable, Deutsche Post usually returns it to the sender and marks it with a label on which four predefined categories of reasons for non-deliverability are given (see Figure 2).

[11] Although there are some other providers for postal deliveries, this guideline focuses on Deutsche Post since it is by far the most prominent service provider in this area.

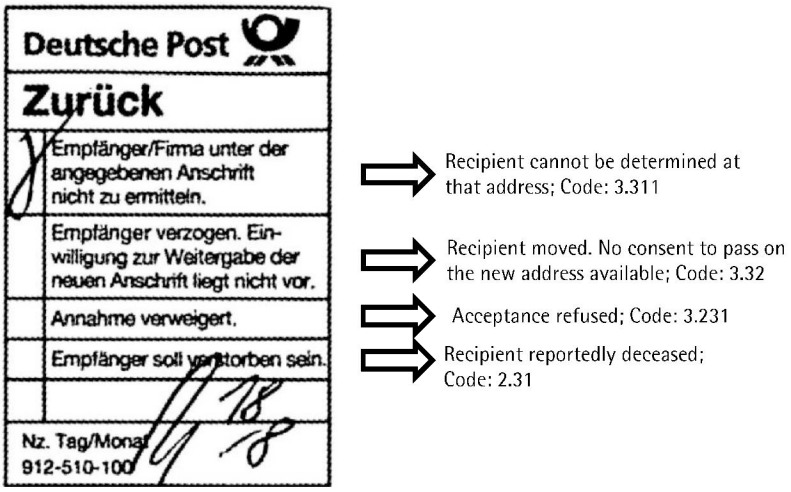

Figure 2: Stamp with predefined categories of reasons for non-deliverability used by Deutsche Post and corresponding AAPOR codes. Source: GESIS Panel

Additionally, the deliverer may record miscellaneous reasons in the blank field at the bottom of the label that might be useful in order to select the respective code. Apart from those four categories, letters may also return with a yellow badge indicating that the postage paid by the sender was not sufficient.

In Table 4 below, the adaptations of the codes for mail surveys of specifically named persons are listed for standard delivery (the final list is displayed in the appendix, Table A4).

Table 4: Adjustments in final disposition codes for mail surveys of specifically named persons in Germany (standard delivery)

# Code	Final Dispositions (AAPOR)	Final Disposition Codes for Mail Surveys in Germany (standard delivery)
1.0	**Returned questionnaire**	=
1.1	Complete	=
1.2	Partial	=
2.0	**Eligible, non-interview**	=
2.10	Refusal & Break-off	=
2.11	Refusal	=
2.111	Other person refusal	=
2.112	Known-respondent-level refusal	=
2.113	Blank questionnaire mailed back, "implicit refusal"	=
2.12	Break-off questionnaire too incomplete to process	=
2.20	Non-contact	=
2.25	Notification that respondent was unavailable during field period	=
2.27	Completed questionnaire, but not returned during field period	=
2.30	Other	=
2.31	Death (including USPS category: Deceased)	**Adaptation:** Death (including Deutsche Postcategory: Empfänger soll verstorben sein)

(*Table 4:* continued)

# Code	Final Dispositions (AAPOR)	Final Disposition Codes for Mail Surveys in Germany (standard delivery)
2.32	Physically or mentally unable/incompetent	=
2.33	Language	=
2.332	Respondent language problem	=
2.333	Wrong language questionnaire sent for needed language	=
2.34	Literacy problems	=
2.36	Miscellaneous	=
3.0	**Unknown eligibility, non-interview**	=
3.10	Nothing known about respondent or address	=
3.11	Not mailed	=
3.19	Nothing ever returned	=
3.20	Unknown if eligible respondent in unit	=
3.21	No screener completed	=
3.23	USPS category: Refused by Addressee	**Omission**
3.231	USPS category: Refused to Accept	**Adaptation:** Deutsche Post category: Annahme verweigert
3.232	USPS category: Refused to Pay Postage	**Omission**
3.24	USPS category: Returned to Sender due to Various USPS Violations by Addressee	**Omission**
3.25	USPS category: Cannot be Delivered	**Omission**
3.251	USPS category: Illegible Address	**Omission**
3.252	USPS category: Insufficient Address on Mail from One Post Office to Another Post Office	**Omission**
3.253	USPS category: No Mail Receptacle	**Omission**
3.254	USPS category: Delivery Suspended to Commercial Mailing Agency	**Omission**
3.30	Unknown Whereabouts, Mailing Returned Undelivered	=
3.31	USPS category: Undeliverable as Addressed	**Omission**
3.311	USPS category: Attempted – Addressee Not Known at Place of Address	**Adaptation:** Deutsche Post category: Empfänger/Firma unter der angegebenen Anschrift nicht zu ermitteln
3.312	USPS category: Postal Box Closed	**Omission**
3.313	No Such Address	**Omission**
3.3131	USPS category: No Such Number	**Omission**
3.3132	USPS category: No Such Post Office in State	**Omission**
3.3133	USPS category: No Such Street	**Omission**
3.3134	USPS category: Vacant	**Omission**
3.314	Not Delivered as Addressed	**Omission**
3.3141	USPS category: Unable to Forward, Not Deliverable as Addressed	**Omission**
3.3142	USPS category: Outside Delivery Limits	**Omission**
3.3143	USPS category: Returned for Better Address	**Omission**
3.32	USPS category: Moved, Left No Address	**Adaptation:** Deutsche Post category: Empfänger verzogen. Einwilligung zur Weitergabe der neuen Anschrift liegt nicht vor.
3.33	USPS category: Returned for Postage	**Adaptation:** Deutsche Post-category: Zu wenig Porto

(*Table 4:* continued)

# Code	Final Dispositions (AAPOR)	Final Disposition Codes for Mail Surveys in Germany (standard delivery)
3.34	USPS category: Temporarily Away, Holding Period Expired	**Omission**
3.35	USPS category: Unclaimed – Failure to Call for Held Mail	**Omission**
3.36	USPS category: No One Signed	**Omission**
3.40	Returned with Forwarding Information	=
3.41	Returned Unopened – Address Correction Provided	=
3.42	Returned Opened – Address Correction Provided	=
3.50	USPS Category: In Dispute about Which Party Has Right to Delivery	**Omission**
3.90	Other	=
4.0	**Not eligible, returned**	=
4.10	Selected Respondent Screened Out of Sample	=
4.70	No eligible respondent	=
4.80	Quota Filled	=
4.81	Duplicate Listing	=
4.90	Other	=

Notes:
Equal sign (=) indicates no change made to AAPOR label.
Omission = AAPOR final disposition code deleted.

As shown in Table 4, several codes listed in the AAPOR Standard Definitions for mail surveys of specifically named persons have no equivalent in the German context, since – in contrast to Deutsche Post – the USPS operates with a much wider variety of information for undeliverable letters.[12]

In the second type of delivery, namely registered post, information about reasons for non-deliverability is the same as in standard delivery, except if no one or only the specifically named person is present at the address of delivery. In these cases, the letter will be forwarded to the next post office.[13] If the letter is not picked up after a certain period of time (7 business days), it is returned to the sender with the information "Nicht abgeholt" (not picked up). In these cases, the AAPOR code 3.36 (USPS category: No One Signed) would be appropriate. The additional postage for the different types of registered post is between 2.15 and 6.80 euros (as of May 2019).

The third type of delivery is Dialogpost (customer post). This mode is attractive from a cost point of view because it is much cheaper than standard delivery (0.33 euros as opposed to 0.70 euros for a standard letter). However, there are some restrictions and disadvantages associated with the use of this delivery type (see www.deutschepost.de/de/d/dialogpost.html). Most importantly, customer post is the preferred choice for most advertising mails, leading to a higher risk that the letter will be thrown away by the target person. Furthermore, the sender receives no information about the reasons for non-deliverability since undeliverable letters are obliterated by Deutsche Post. When using customer post as

[12] In mail surveys, researchers and survey organizations often implement several contact attempts, as is suggested by Dillman, Smyth, and Christian (2014). Here (and in all other modes of data collection), the question arises as to how to deal with different information for one target person over several contact attempts. We propose, as suggested for telephone surveys (see p. 9), to consider the entire sequence of contact attempts (instead of simply relying on the outcome of the last contact attempt) when deciding about the final disposition code.

[13] There are different variants of registered post: in the case of personal registered post only the specifically named person or an authorized person is allowed to receive the letter, while in the basic variant of registered post, other household members can also receive it (for the different variants and additional information see www.deutschepost.de/de/e/einschreiben.html).

the type of delivery, none of the AAPOR codes referring to the more specific information provided by the USPS are applicable.

Finally, Deutsche Post also offers the service Premiumadress (prime address) (www.deutschepost.de /de/p/premiumadress.html) in which address lists provided by the customer are checked and updated before delivery. This might be especially helpful if the researcher or survey organization has certain doubts about the quality of the addresses. With regard to disposition codes, an advantage of prime address is that it may be combined with customer post. If the sender uses customer post and selects one of two specific modules of prime address (called "Plus" or "Fokus"), undeliverables are treated as in standard delivery. This means that undeliverable letters are not destroyed (as in the basic variant of customer post) but returned to the sender with the same reasons for non-deliverability as in standard delivery. In Table A6 in the appendix, all the different types of delivery are listed together with their costs and the information the sender receives about non-deliverables.

6.2 Disposition Codes for Mail Surveys of Unnamed Persons

This section addresses mail surveys for unnamed persons. This means a survey recruits its respondents via postal mail in which the sampling unit is the address of a residence or business (i.e., an entity at a specific geographic location). This method typically uses some type of screener to identify a responsible household member or eligible target person within that unit to complete the questionnaire. There are different types of screeners to determine if there is at least one eligible respondent. For example, the Kish method (Kish, 1949) or some form of the so-called birthday methods (Groves et al., 2009, p. 136) might be used to randomly (or pseudo-randomly) sample a respondent among all eligible persons or a purposively determined respondent might be designated by her role within the unit (e.g., a parent or guardian of any children in the household, the person most knowledgeable about the household's expenses, the accountant for the business, or the secretary-treasurer of a club or other voluntary organization). Of course, other selection procedures, such as including all eligible adults, might also be employed.

In Germany, Deutsche Post does not offer standard delivery for unnamed letters. Instead, those letters are classified as "teiladressiert" (partly addressed) and for those deliveries Deutsche Post offers a service called Postwurfspezial (special customer post; see Table A6 in the appendix). If a partly addressed letter is not deliverable (e.g., because the address does not exist), it will be destroyed, so the sender receives no information about reasons for non-deliverability. Consequently, none of the AAPOR disposition codes that refer to information provided by the USPS are applicable for unnamed letters in the German context. Hence, the researcher or survey organization only receives information about non-interviews from the recipients themselves and will only be able to report completion rates instead of response rates. The (reduced) final code scheme for mail surveys of unnamed persons in Germany can be found in the appendix in Table A5.

6.3 Case Study: The GESIS Panel – A Mail Survey of Specifically Named Persons

This section covers an example of the usage of disposition codes for mail surveys of specifically named persons based on the GESIS Panel (for further details about the GESIS Panel, see p. 16). The aim of this section is to illustrate how the adaptation of the AAPOR codes works in practice. Moreover, the example may sensitize researchers to the need for additional adaptations that might be necessary due to their specific study design.

Our case study will focus on the mail part of the survey between January 2016 and December 2016 (see Table 5). This time period includes six panel waves and we will describe the aggregated results. We

chose this approach in order to be able to show a greater variety of different disposition codes. The results of each panel wave are listed in the appendix (Table A7).

Overall, 7,267 persons were contacted via a (postal) mail invitation and received a print version of the questionnaire. No reminder was sent in any of the six waves. Eighty-seven per cent (N = 6,322) of the target persons returned the completed questionnaire via mail (Code 1.1), while 1.5 per cent (N = 107) of the target persons returned the questionnaire partially completed via mail (Code 1.2).[14] In sum, the application of the AAPOR codes for returned questionnaires is very straightforward.

Table 5: Final disposition codes: mail respondents of the GESIS Panel between January 2016 and December 2016 (6 waves)

# Code	Final Disposition Codes (GESIS Panel, Mail participants)	Total	Per Cent
1.0	**Returned questionnaire**	**6,429**	**88.47**
1.1	Complete	6,322	87.00
1.2	Partial or break-off sufficient information	107	1.47
2.0	**Eligible, non-interview**	**55**	**0.76**
2.11	*Deutsche Post* category: Annahme verweigert	4	0.06
2.1121	Explicit refusal by contacting the panel management	13	0.18
2.11211	Explicit refusal with incentive (retour)	4	0.06
2.11212	Explicit refusal no incentive (retour)	1	0.01
2.113	Blank questionnaire mailed back, implicit refusal	2	0.03
2.12	Break-off: Questionnaire too incomplete to process	23	0.32
2.31	Death (including Deutsche Post category: Empfänger soll verstorben sein)	1	0.01
2.32	Physically or mentally unable/incompetent	8	0.11
3.0	**Unknown eligibility, non-interview**	**782**	**10.76**
3.19	Nothing ever returned	729	10.03
3.31	Undeliverable as addressed	1	0.01
3.311	Deutsche Post category: Empfänger/Firma unter der angegebenen Anschrift nicht zu ermitteln	52	0.72
Total		**7,267**	**100.00**

Note: The table includes only those codes with valid cases in the respective panel waves.

With regard to the codes that belong to category 2.0 (eligible, non-interview), there are two noticeable aspects. The first one is related to those cases in which the addressee refuses to accept the letter. While in Section 6.1, we suggested using the AAPOR code 3.231 (USPS category: Refused to Accept), the GESIS Panel assigns the code 2.11 (AAPOR code: Refusal), thereby regarding these (four) cases as eligible. At an advanced stage of a longitudinal survey, this makes perfect sense since the researchers successfully communicated with the respondent in the past using this address. However, in a cross-sectional survey, nothing is known about the eligibility of the person who refused to accept. Therefore, those cases should be assigned to the category of unknown eligibility in a cross-sectional survey.

The second aspect concerns the codes 2.1121 to 2.11212. They represent an extension of the AAPOR scheme and reflect the specific infrastructure and design of the GESIS Panel. First, all participants of the GESIS Panel are provided with the panel management's contact details. Between January and De-

[14] The relatively high response rate is typical for a panel survey, where respondents have previously agreed to participate regularly. If the respondents had been contacted for the first time, lower response rates would have been likely.

cember 2016, 13 panellists made use of these contact details to inform the panel management about their refusal. Second, the GESIS Panel offers incentives to its participants so that a differentiation can be made between respondents who sent back the incentive and those who did not. The other codes within the second category assigned by the GESIS Panel are quite clear: break-off (2.12), physical or mental inability (2.32), and blank questionnaire mailed back (2.113) are one-to-one adaptations from AAPOR. Finally, the AAPOR code Death (including the USPS category: Deceased) is equivalent to the Deutsche Post category "Empfänger soll verstorben sein" ("recipient reportedly deceased"), as was suggested in Section 6.1.

Within the category of unknown eligibility, 10.0% (N = 729) of all addressees did not send anything back (Code 3.19) while for one person, Deutsche Post mailed an envelope back without indicating any reason on the stamp. This case was assigned to the category "Undeliverable as Addressed" (Code 3.31). Finally, for 0.7% (N = 52) of all target persons, Deutsche Post reported a delivery attempt, but the person could not be located under this address (Deutsche Post category: "Empfänger unter der angegebenen Anschrift nicht zu ermitteln" ("recipient cannot be determined at that address", Code 3.311). The code 3.32 (Deutsche Post category: "Empfänger verzogen. Einwilligung zur Weitergabe der neuen Anschrift liegt nicht vor" ("Recipient moved. No consent to pass on the new address available") was not applicable in any of the six waves.

6.4 Calculation of Response Rates for the Mail Survey in the Case Study

The AAPOR Standard Definitions (2016, p. 61) propose six response rates that mostly differ in how partially completed interviews and cases of unknown eligibility (UH and U) are treated. As our example illustrates, response rates 5 and 6 are the highest because unknown eligibility is treated as non-eligible. In response rates 2, 4, and 6, partially completed interviews are treated as completed interviews.

$$RR1 = \frac{I}{(I+P)+(R+NC+O)+(UH+UO)} = \frac{6322}{(6322+107)+(47+0+9)+(729+52)} = 86.77\%$$

$$RR2 = \frac{(I+P)}{(I+P)+(R+NC+O)+(UH+UO)} = \frac{6429}{(6322+107)+(47+0+9)+(729+52)} = 88.47\%$$

$$RR3 = \frac{I}{(I+P)+(R+NC+O)+e(UH+UO)} = \frac{6322}{(6322+107)+(47+0+9)+1(729+52)} = 86.77\%$$

$$RR4 = \frac{(I+P)}{(I+P)+(R+NC+O)+e(UH+UO)} = \frac{6429}{(6322+107)+(47+0+9)+1(729+52)} = 88.47\%$$

$$RR5 = \frac{I}{(I+P)+(R+NC+O)} = \frac{6322}{(6322+107)+(47+0+9)} = 97.49\%$$

$$RR6 = \frac{(I+P)}{(I+P)+(R+NC+O)} = \frac{6429}{(6322+107)+(47+0+9)} = 99.14\%$$

Explanation of the abbreviations:

- RR = Response rate
- I = Complete interview
- P = Partial interview
- R = Refusal and break-off

- NC = Non-contact
- O = Other
- UH = Unknown if household/occupied HU
- UO = Unknown, other

7. Conclusion

To date, there is no clear guidance on how to adapt the final disposition codes proposed by AAPOR (2016) in a comparable manner to the German context. Our survey guideline aims to close this information gap: it offers operational definitions for surveys conducted in Germany and covers different modes of data collection.

As the previous sections showed, the application of AAPOR's final disposition codes is unproblematic for telephone and internet surveys, since the "technical contexts" between the United States and Germany are equivalent. This is, however, not the case for face-to-face and mail surveys: AAPOR's final disposition codes for face-to-face interviews only cover household sampling designs. For German surveys using such a sampling design (e.g., a random-route approach), the application of the AAPOR codes is quite straightforward. However, registry-based sampling is predominant for face-to-face interviews in Germany, and this approach requires several adaptations. For mail surveys, differences in the final disposition codes reflect different reasons for non-deliverability that are communicated to the sender by Deutsche Post compared to the US Postal Service (USPS).

In addition to proposing a possible application of AAPOR's final disposition codes in the German context, the second aim of this guideline is to sensitize researchers to the adequate usage of these coding schemes. Thus, the section covering telephone surveys critically discusses common practices in reporting response rates and proposes measures to ensure a more correct reporting of response rates in CATI surveys. Moreover, in the section dealing with internet and mail surveys (p. 16), we introduced how the codes are used in the GESIS Panel, a mixed-mode survey conducted in Germany. Finally, we repeatedly underlined other important aspects that ensure an adequate application of the final disposition codes, such as the consideration of survey-specific characteristics (e.g., cross-sectional vs panel surveys), and the need for a precise definition of the target population and the status date.

Since in Germany many surveys are carried out by survey organizations, survey researchers have to ensure that these survey organizations meet the requirements for the adequate application of the final disposition codes – including, first and foremost, a detailed documentation of all responses from the field (Schröder et al., 2016). This will not only help to ensure the comparability of response rates from different surveys, but also complies with crucial criteria for good scientific research, such as transparency and detailed documentation of the data collection process.

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Appendix

Table A1: Final disposition codes for telephone surveys in Germany

# Code	Final Disposition Codes
1.0	**Interview**
1.1	Complete
1.2	Partial
2.0	**Eligible, non-interview**
2.10	Refusal and break-offs
2.11	Refusals
2.111	Household-level refusal
2.112	Known respondent refusal
2.12	Break-off
2.20	Non-contact
2.21	Respondent never available
2.22	Telephone answering device (message confirms residential household)
2.221	Message left
2.222	No message left
2.30	Other
2.31	Dead
2.32	Physically or mentally unable/incompetent
2.33	Language
2.331	Household-level language problem
2.332	Respondent language problem
2.333	No interviewer available for needed language
2.34	Inadequate audio quality
2.35	Location/activity not allowing interview
2.36	Miscellaneous
3.0	**Unknown eligibility, non-interview**
3.10	Unknown if housing unit
3.11	Not attempted or worked
3.12	Always busy
3.13	No answer
3.14	Telephone answering device (don't know if housing unit)
3.15	Telecommunication technological barriers, e.g., call-blocking
3.16	Technical phone problems
3.161	Ambiguous operator's message
3.20	Housing unit, unknown if eligible respondent
3.21	No screener completed
3.30	Unknown if person is household resident
3.90	Other
4.0	**Not eligible**
4.10	Out of sample
4.20	Fax/data line
4.30	Non-working/disconnected number
4.31	Non-working number
4.32	Disconnected number
4.33	Temporarily out of service
4.40	Special technological circumstances

(*Table A1:* continued)

# Code	Final Disposition Codes
4.41	Number changed
4.43	Call forwarding
4.431	Residence to residence
4.432	Non-residence to residence
4.44	Pagers
4.45	Cellphone
4.46	Landline phone
4.50	Non-residence
4.51	Business, government office, other organization
4.52	Institution
4.53	Group quarters
4.54	Person not household resident
4.70	No eligible respondent
4.80	Quota filled
4.90	Other

Table A2: Final disposition codes for registry-based face-to-face surveys

# Code	Final Disposition Codes
1.0	**Interview**
1.1	Complete
1.2	Partial
2.0	**Eligible, non-interview**
2.10	Refusal and break-offs
2.11	Refusals
2.111	Household-level refusal
2.112	Known-respondent refusal
2.12	Break-off
2.20	Non-contact
2.23	Unable to enter building/reach housing unit
2.24	No one at residence
2.25	Respondent away/unavailable
2.40	Respondent moved
2.41	Respondent moved within country but cannot be followed up
2.42	Respondent moved abroad **after** status date
2.43	Respondent moved to institution **after** status date
2.50	Not attempted or worked
2.30	Other
2.31	Respondent died **after** status date
2.32	Physically or mentally unable/incompetent
2.33	Language problem
2.331	Household-level language problem
2.332	Respondent language problem
2.333	No interviewer available for needed language
2.36	Miscellaneous
3.0	**Unknown eligibility, non-interview**
3.80	Unknown whereabouts
3.81	Respondent moved, unknown whereabouts
3.82	Respondent not known at address
3.90	Other
4.0	**Not eligible**
4.10	Out of sample
4.16	Respondent moved to institution **prior** to status date
4.17	Respondent moved abroad **prior** to status date
4.18	Respondent died **prior** to status date
4.19	Address does not exist or not residential address
4.90	Other

Table A3: Final disposition codes for Internet surveys of specifically named persons in Germany

# Code	Final Disposition Codes
1.0	**Returned questionnaire**
1.1	Complete
1.2	Partial or break-off with sufficient information
2.0	**Eligible, non-interview**
2.11	Refusal
2.111	Explicit refusal
2.112	Implicit refusal
2.1121	Logged on to survey, did not complete any items
2.1122	Read receipt confirmation, refusal
2.12	Break-off or partial with insufficient information
2.20	Non-contact
2.26	Respondent was unavailable during field period
2.27	Completed questionnaire, but not returned during field period
2.30	Other
2.33	Language barrier
3.0	**Unknown eligibility, non-interview**
3.10	Nothing known about respondent or address
3.11	No invitation sent
3.19	Nothing ever returned
3.30	Invitation returned undelivered
3.40	Invitation returned with forwarding information
3.90	Other
3.91	Returned from an unsampled e-mail address
4.0	**Not eligible, returned**
4.10	Selected respondent screened out of sample
4.80	Quota filled
4.81	Duplicate listing
4.90	Other

Table A4: Final disposition codes for mail surveys of specifically named persons in Germany (standard delivery)

# Code	Final Disposition Codes
1.0	**Returned questionnaire**
1.1	Complete
1.2	Partial
2.0	**Eligible, non-interview**
2.10	Refusal & Break-off
2.11	Refusal
2.111	Other person refusal
2.112	Known-respondent-level refusal
2.113	Blank questionnaire mailed back, "implicit refusal"
2.12	Break-off questionnaire too incomplete to process
2.20	Non-contact
2.25	Notification that respondent was unavailable during field period
2.27	Completed questionnaire, but not returned during field period
2.30	Other
2.31	Death (including Deutsche Post category: Empfänger soll verstorben sein)
2.32	Physically or mentally unable/incompetent
2.33	Language
2.332	Respondent language problem
2.333	Wrong language questionnaire sent for needed language
2.34	Literacy problems
2.36	Miscellaneous
3.0	**Unknown eligibility, non-interview**
3.10	Nothing known about respondent or address
3.11	Not mailed
3.19	Nothing ever returned
3.20	Unknown if eligible respondent in unit
3.21	No screener completed
3.231	Deutsche Post category: Annahme verweigert
3.30	Unknown whereabouts, mailing returned undelivered
3.311	Deutsche Post category: Empfänger/Firma unter der angegebenen Anschrift nicht zu ermitteln
3.32	Deutsche Post category: Empfänger verzogen. Einwilligung zur Weitergabe der neuen Anschrift liegt nicht vor.
3.33	Deutsche Post category: Zu wenig Porto
3.40	Returned with forwarding information
3.41	Returned unopened – address correction provided
3.42	Returned opened – address correction provided
3.90	Other
4.0	**Not eligible**
4.10	Selected respondent screened out of sample
4.70	No eligible respondent
4.80	Quota filled
4.81	Duplicate listing
4.90	Other

Table A5: Final disposition codes for mail surveys of unnamed persons in Germany

# Code	Final Disposition Codes
1.0	**Returned questionnaire**
1.1	Complete
1.2	Partial
2.0	**Eligible, non-interview**
2.10	Refusal & Break-off
2.11	Refusal
2.112	Known-respondent-level refusal
2.113	Blank questionnaire mailed back, "implicit refusal"
2.12	Break-off questionnaire too incomplete to process
2.20	Non-contact
2.25	Notification that respondent was unavailable during field period
2.27	Completed questionnaire, but not returned during field period
2.30	Other
2.31	Death
2.32	Physically or mentally unable/incompetent
2.33	Language
2.332	Respondent language problem
2.333	Wrong language questionnaire sent for needed language
2.34	Literacy problems
2.35	Nonrespondent completes questionnaire
2.36	Miscellaneous
3.0	**Unknown eligibility, non-interview**
3.10	Nothing known about respondent or address
3.11	Not mailed
3.19	Nothing ever returned
3.20	Unknown if eligible respondent in unit
3.21	No screener completed
3.30	Unknown whereabouts, mailing returned undelivered
3.33	Deutsche Post category: Zu wenig Porto
3.40	Returned with forwarding information
3.41	Returned unopened – address correction provided
3.42	Returned opened – address correction provided
3.90	Other
4.0	**Not eligible**
4.10	Selected respondent screened out of sample
4.70	No eligible respondent
4.80	Quota filled
4.81	Duplicate listing
4.90	Other

Table A6: Types of delivery, postages and information about reasons for non-deliverability

Type of delivery	Postage (per letter, as of May 2019)	Information: Empfänger soll verstorben sein *(Reportedly deceased)*	Information: Annahme verweigert *(Acceptance refused)*	Information: Empfänger nicht zu ermitteln *(Cannot be determined)*	Information: Empfänger verzogen *(Moved, no consent to pass on new address)*	Information: Nicht abgeholt *(Not picked up)*
Standard delivery	0.70–2.60 €*	√	√	√	√	X
Einschreiben (registered post)	0.70–2.60 €* + 2.15–6.80 €*/**	√	√	√	√	√
Dialogpost Basis (customer post)	0.33–1.09 €*	X	X	X	X	X
Standard delivery / customer post & Premiumadress (prime address) Plus / Fokus	0.70–2.60 €* (SD) 0.33–1.09 €* (CP)	√ (+0.86 €)***	√ (+0.39 €)***	√ (+0.39/ 0.67 €)****	√ (+0.39 €)***	X
Postwurfspezial (special customer post)	0.15–0.71* €	X	X	X	X	X

* Postage depends on the size and weight of the letter
** Additional fee depending on the type of registered post
*** Additional fee for each letter with the respective reason for non-deliverability
**** Additional fee is 0.39 € if the letter is only sent back and 0.67 € if the new address is provided too

Table A7: Final disposition codes: mail respondents of the GESIS Panel in each wave between January and December 2016

# Code	Final Disposition Codes (GESIS Panel, PAPI-participants)	Wave 1 (in %)	Wave 2 (in %)	Wave 3 (in %)	Wave 4 (in %)	Wave 5 (in %)	Wave 6 (in %)	Total
1.0	**Returned questionnaire**							
1.1	Complete	88.60	86.95	85.28	86.84	87.39	86.85	6,322
1.2	Partial or break-off sufficient information	1.49	0.80	2.21	0.92	2.04	1.39	107
2.0	**Eligible, non-interview**							
2.11	*Deutsche Post* category: Annahme verweigert	0.00	0.00	0.08	0.08	0.09	0.09	4
2.1121	Explicit refusal by contacting the panel management	0.16	0.00	0.16	0.25	0.00	0.52	13
2.11211	Explicit refusal with incentive (retour)	0.00	0.08	0.25	0.00	0.00	0.00	4
2.11212	Explicit refusal no incentive (retour)	0.00	0.08	0.00	0.00	0.00	0.00	1
2.113	Blank questionnaire mailed back, implicit refusal	0.00	0.00	0.00	0.08	0.00	0.09	2
2.12	Break-off: Questionnaire too incomplete to process	0.08	0.32	0.33	0.25	0.51	0.44	23
2.31	Death (including Deutsche Post category: Empfänger soll verstorben sein)	0.00	0.00	0.08	0.00	0.00	0.00	1
2.32	Physically or mentally unable/incompetent	0.16	0.08	0.08	0.08	0.26	0.00	8
3.0	**Unknown eligibility, non-interview**							
3.19	Nothing ever returned	8.49	10.49	10.71	10.82	9.45	10.28	729
3.31	Undeliverable as addressed	0.00	0.08	0.00	0.00	0.00	0.00	1
3.311	Deutsche Post category: Empfänger/Firma unter der angegebenen Anschrift nicht zu ermitteln	1.02	1.12	0.82	0.67	0.26	0.35	52
Total		1,272	1,249	1,223	1,201	1,174	1,148	7,267